Data Evaluation Report on the Acute Oral Toxicity of BAS 800 H (Saflufenacil) to Mallard Duck (*Anas platyrhynchos*)

PMRA Submission Number: 2008-0431
PMRA Document ID: 1547183 EPA MRID Number: 47127912

Data Requirement:	PMRA Data Code	9.6.2.2
	EPA DP Barcode	D349851
	OECD Data Point	IIA 8.1.1
	EPA MRID	47127912
	EPA Guideline	OPPTS 850.2100

Test material: BAS 800 H **Purity:** 93.8%
Common name Saflufenacil
Chemical name:
IUPAC: *N'*-{2-chloro-4-fluoro-5-[1,2,3,6-tetrahydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)-pyrimidin-1-yl]benzoyl}-*N*-isopropyl-*N*-methylsulfamide
CAS: 2-chloro-5-[3,6-dihydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)-1(2*H*)-pyrimidinyl]-4-fluoro-*N*-[[methyl(1-methylethyl)amino]sulfonyl]benzamide
CAS No.: 372137-35-4
Synonyms: None reported

Primary Reviewer: Christie E. Padova
Staff Scientist, Dynamac Corporation
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Date: 04/04/08

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DEWHA-APVMA
Date: 06/09/09

Company Code	BAZ
Active Code	SFF
Use Site Category	13 (terrestrial feed crops) and 14 (terrestrial food crops)
EPA PC Code	118203

CITATION: Zok, S. 2006. BAS 800 H – Acute Toxicity in the Mallard Duck (*Anas platyrhynchos*) After Single Oral Administration (LD_{50}). Unpublished study performed by Experimental Toxicology and Ecology, BASF Aktiengesellschaft, Ludwigshafen/Rhein, Germany. Laboratory Report No. 13W0414/015145. Study sponsored by BASF Corporation, Research Triangle Park, NC. Study initiated September 1, 2005 and submitted February 27, 2006.

DISCLAIMER: This document provides guidance for EPA and PMRA reviewers on how to complete a data evaluation record after reviewing a scientific study concerning the acute oral toxicity of a pesticide to avian species. It is not intended to prescribe conditions to any external party for conducting this study nor to establish absolute criteria regarding the assessment of whether the study is scientifically sound and whether the study satisfies any applicable data requirements. Reviewers are expected to review and to determine for each study, on a case-by-case basis, whether it is scientifically sound and provides sufficient information to satisfy applicable data requirements. Studies that fail to meet any of the conditions may be accepted, if appropriate; similarly, studies that meet all of the

conditions may be rejected, if appropriate. In sum, the reviewer is to take into account the totality of factors related to the test methodology and results in determining the acceptability of the study.

EXECUTIVE SUMMARY:

The acute oral toxicity of BAS 800 H (saflufenacil) to *ca.* 5-month old mallard duck (*Anas platyrhynchos*) was assessed over 14 days. BAS 800 H was administered to the birds by gavage at nominal levels of 0 (vehicle control), 500, 1000, and 2000 mg a.i./kg bw (adjusted for purity). The 14-day acute oral LD_{50} was >2000 mg a.i./kg bw (>limit dose). The 14-day NOAEL was 2000 mg a.i./kg bw, as there were no mortalities, sub-lethal signs of toxicity, or treatment-related effects on body weight or food consumption during the 14-day study. BAS 800 H (saflufenacil) would be classified as practically non-toxic to young adult mallard duck (*Anas platyrhynchos*) in accordance with the classification system of the U.S. EPA.

This toxicity study is classified as **ACCEPTABLE** to **U.S. EPA** and as **FULLY RELIABLE** to **PMRA and APVMA** as it is scientifically sound and satisfies the guideline requirement for an acute oral toxicity study with mallard duck.

Results Synopsis

Test Organism Size/Age (Mean Weight): *ca.* 5 months old; 747.6-1229.7 g (combined sexes)

LD_{50}: >2000 mg a.i./kg bw 95% C.I.: N/A
Probit slope: N/A 95% C.I.: N/A
NOAEL: 2000 mg a.i./kg bw
Endpoint(s) Affected: none

Data Evaluation Report on the Acute Oral Toxicity of BAS 800 H (Saflufenacil) to Mallard Duck (*Anas platyrhynchos*)

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I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study protocol was based on procedures outlined in the U.S. EPA Pesticide Assessment Guidelines, §71-1 (1982) taking into account the U.S. EPA Standard Evaluation Procedure, EPA-540/9-85-007 (1985); and U.S. EPA Ecological Effects Test Guidelines, OPPTS 850.2100 (1996). Deviations from OPPTS 850.2100 included:

1. Five females did not meet the minimum weight requirement of 900 g at study initiation.
2. The constant dosing volume (10 g/kg bw) exceeded the maximum recommended volume (5 mL/kg bw) for mallard. However, no signs of regurgitation were observed following administration.

These deviations do not affect the scientific soundness of the study.

COMPLIANCE: Signed and dated GLP, Quality Assurance, and Data Confidentiality statements were provided. The study was conducted in accordance with the GLP Principles of the OECD and of the German "Chemikaliengesetz" (Chemicals Act).

A. MATERIALS:

1. Test Material BAS 800 H

Description: Solid, light beige

Lot No./Batch No. : COD-000515

Purity: 93.8%

Stability of compound under test conditions: Verified in double distilled water for 96 hours at ambient temperature.

Storage conditions of test chemicals: Room temperature

Physicochemical properties of saflufenacil.

Parameter	Values	Comments
Water solubility at 20°C	2.1 g/L	pH 7
Vapor pressure	4.5×10^{-15} Pa	20°C
UV absorption	272	pH1/pH7
pKa	Neutral	Ambient pH
Kow	Log P_{ow} 2.6	20°C

(OECD recommends water solubility, stability in water and light, pKa, Pow, and vapor pressure of test compound)

2. Test Organism:

Species (common and scientific names):	Mallard duck (*Anas platyrhynchos*)
Age at study initiation:	Young adult, *ca.*5 months old
Weight at study initiation (mean and range):	914.9-1229.7 g males (group means of 1028.4-1083.7 g males), 747.6-1059.1 g females (group means of 915.9-972.5 g females)
Source:	Geflügelhof Knerr, Rieschweiler-Mühlbach, Germany

(EPA recommends using either bobwhite quail or mallard duck. Birds should be at least 16 weeks old at test initiation and should be uniform in size and weight as well as phenotypically indistinguishable from wild birds).

B. STUDY DESIGN:

1. Experimental Conditions

a. Range-finding study: None reported. The dosages were selected in agreement with the sponsor and in consideration of the results of the acute oral Northern bobwhite study.

b. Definitive study

Table 1: Experimental Parameters

Parameter	Details	Remarks *Criteria*
Acclimation		
Period:	15 days	*The recommended acclimation period is a minimum of 15 days. OECD recommends a minimum of 7 days.*
Conditions: (same as test or not)	Same as test	
Feeding:	"Provimi Kliba SA" experimental diet for quails and ducks in meal form (Kaiseraugst, Basel, Switzerland) and municipal water were offered *ad libitum*	
Health: (any mortality observed)	0% mortality during the 3 days prior to dosing	

Parameter	Details	Remarks
		Criteria
Pen size and construction materials	1.3 x 1.3 x 1.3 m galvanized or stainless steel wire mesh cages.	There was approximately 3380 cm^2 floor space per bird.
		Pen size and construction should conform to good husbandry practices and should not create crowding stress. *OECD recommends that pens be suitable for the captive rearing of that species.*
Test duration	14 days	
		Recommended test duration is one day for dosing and at least 14 days observation.
Dose preparation [Indicate method of confirmation of dose]	Dispersed in 0.5% aqueous carboxy methyl cellulose (CMC) suspension	
Mode of dose administration	Gavage, within 4 hours of preparation	
		Gavage or gelatin capsule is recommended
<u>Dose levels</u> nominal: measured:	0 (vehicle control), 500, 1000, and 2000 mg a.i./kg bw Verified; 97-109% of nominal concentrations for all levels	Nominal concentrations were adjusted for the purity of the test substance.
		Dose levels should be a minimum of 5 treatment levels unless LD_{50} is demonstrated to be greater than 2000 mg a.i./kg

Parameter	Details	Remarks *Criteria*
Solvent/vehicle, if used type: amount/bw:	 0.5% aqueous CMC 10 mL/kg bw	The test substance was suspended in 0.5% aqueous CMC with an ultra turrax stirrer. During administration, the treatment solution was continuously mixed using a magnetic stirrer, and the administration was finished within about 4 hours after start of the preparation. Guidance specifies that the dosing volume should not exceed 5 mL/kg bw for mallard. *The test material should be administered without a vehicle if possible. Maximum vehicle should not exceed 0.1 to 1.0% of body weight.*
Number of birds per groups/treatment for negative control: for solvent/vehicle control: for treated:	 N/A 10 (5 per sex) 10 (5 per sex)	 *Recommended number of birds in a treatment group is 10 and 10 birds for each control and vehicle group.*
No. of feed withholding days before dosing	15-20 hours	*Food should be withheld for at least 15 hours prior to dosing.*
Test conditions Temperature: Relative humidity: Photoperiod:	 20.6 ± 0.3°C (19.8-23.4°C) 62 ± 14% (34-95%) 8 hours light/16 hours dark	Light intensity (floor in the middle of the cages) was 435-621 Lux. *The recommended photoperiod is 10 hours of light and 14 hours of dark.*
Reference chemical, if used name: concentrations tested:	None tested	

2. Observations:

Table 2: Observations

Criteria	Details	Remarks *Criteria*
Parameters measured (mortality/individual body weight at test initiation and termination/ mean feed consumption/ others)	- Mortality - Clinical signs of toxicity - Food consumption - Body weight	*Body weight should be measured at test initiation, on day 14 and at the end of the test if the test is extended beyond 14 days. Mortality should not be more than 10% in controls.* *Feed consumption should be measured as average daily food consumption.*
Indicate if the test material was regurgitated	Birds were observed for regurgitation for at least 1 hour after dosing; no bird regurgitated parts of the test substance.	*Regurgitation is an indication that the dose was rejected. If this problem persists, the test should be repeated.*
Groups on which necropsies were performed	All birds were subjected to a gross pathological examination.	*Gross necropsies should be performed with inspections of the GI tract, liver, kidneys, heart, and spleen.*
Observation intervals	Mortality and signs of toxicity were observed three times on the day of dosing and daily thereafter. Body weights were measured individually on Days 0, 7, and 14. Average food consumption was estimated for Days 0 to 7, and 7 to 14.	
Were raw data included?	Yes.	

II. RESULTS AND DISCUSSION:

A. MORTALITY:

No mortality was observed at any treatment or control level during the 14-day study. The 14-day LD_{50} was >2000 mg a.i./kg bw.

Table 3: Effect of BAS 800 H (Saflufenacil) on Mortality of Mallard Duck.

Treatment (mg a.i./kg bw)		No. of Birds	Cumulative Mortality				
			day 1	day 2	day 3	day 4	day 14
Vehicle control		10	0	0	0	0	0
500		10	0	0	0	0	0
1000		10	0	0	0	0	0
2000		10	0	0	0	0	0
NOAEL		2000 mg a.i./kg bw					
LD_{50}		>2000 mg a.i./kg bw					
Reference chemical	mortality	N/A					
	LD_{50}	N/A					
	NOAEL	N/A					

B. SUBLETHAL TOXICITY ENDPOINTS:

No treatment-related toxic signs were observed at any dose level. Liquid feces were observed in all test groups including the control group on the day of dosing as a consequence of the starvation period. In the dose groups, liquid feces were observed for 2 days additional after dosing; however, this was not regarded as a relevant effect as the difference was only slight. The NOAEL for clinical signs of toxicity was 2000 mg a.i./kg bw.

No statistically-significant reductions in body weights of males or females were observed at Days 7 or 14. In addition, based upon visual inspection of the data, no treatment-related effects on food consumption were observed in any dose group during the study. The NOAEL for both endpoints was 2000 mg a.i./kg bw.

At necropsy, no abnormalities caused by the test substance were detected in surviving birds after sacrifice.

Table 4: Sublethal Effect of BAS 800 H (Saflufenacil) on Mallard Duck.

Mean Body Weight, g						
Treatment, (mg/kg bw)	**Males**			**Females**		
	Day 0	**Day 7**	**Day 14**	**Day 0**	**Day 7**	**Day 14**
Vehicle control	1041.9	1197.0	1199.5	915.9	1067.9	1081.7
500	1083.7	1183.0	1267.5	962.0	1138.5	1112.8
1000	1077.6	1200.6	1270.4	972.5	1117.1	1100.1
2000	1028.4	1179.8	1214.3	924.3	1100.6	1097.6
NOAEL	2000 mg a.i./kg bw			2000 mg a.i./kg bw		
EC_{50}	Not determined			Not determined		

Mean Feed Consumption, g/bird/day				
Treatment, (mg/kg bw)	**Males**		**Females**	
	Days 0-7	**Days 7-14**	**Days 0-7**	**Days 7-14**
Vehicle control	189.1	150.6	178.7	138.6
500	226.3	171.5	179.3	141.2
1000	212.6	194.7	183.4	169.5
2000	222.1	196.9	190.0	168.4
NOAEL	2000 mg a.i./kg bw		2000 mg a.i./kg bw	
EC_{50}	Not determined			

C. REPORTED STATISTICS:

As no mortalities were observed, the LD_{50} was visually determined to be greater than the highest dosage level. Body weight data were examined by a Dunnett-Test via DATATOX F1 statistical software (INSTEM-Toxicology data system). No statistical analysis was applied to separate mean responses among treatment groups for food consumption. Results were provided in terms of nominal concentrations.

D. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: The reviewer statistically verified the results for male and female body weight gain using ANOVA, followed by Dunnett's test via Toxstat statistical software. Prior to conducting this test, the data were found to satisfy the assumptions of normality and homogeneity of variances.

LD_{50}: >2000 mg a.i./kg bw 95% C.I.: N/A

Probit slope: N/A 95% C.I.: N/A
NOAEL: 2000 mg a.i./kg bw
Endpoint(s) Affected: none

E. STUDY DEFICIENCIES:

There were no significant deviations from U.S. EPA OPPTS Guideline No. 850.2100 affecting the scientific soundness or acceptability of this study.

F. REVIEWER'S COMMENTS:

The reviewer's conclusions agreed with the study authors.

The stability of SCR 4054449H, N15 (white solid, purity 94.79%) in DMSO and double-distilled water was assessed in July 2003. Recoveries of the test substance after 0 and 96 hours of ambient storage were 99.2 and 99.0% of nominal concentrations, respectively. The study author reported that based on the results from this study, the test substance was considered to be stable also in 0.5% CMC solution.

An analytical concentration control was performed for all dose levels as they were prepared separately. Samples of the dosing solutions (in 0.5% aqueous CMC) were diluted with acetonitrile:double distilled water (1:1, v:v), and aliquots were analyzed using HPLC with UV (270 nm) detection. Recoveries were 97, 106, and 109% of nominal concentrations for the 500, 1000, and 2000 mg a.i./kg bw levels, respectively.

In-life dates were September 14-28, 2005.

G. CONCLUSIONS:

This study is scientifically sound and is classified as ACCEPTABLE to U.S. EPA and as FULLY RELIABLE to PMRA and APVMA. No mortality, sub-lethal signs of toxicity, or treatment-related effects on body weight or food consumption were observed at any control or treatment level during the 14-day study. The 14-day LD_{50} was >2000 mg a.i./kg bw (>limit dose), and the NOAEL was 2000 mg a.i./kg bw.

LD_{50}: >2000 mg a.i./kg bw 95% C.I.: N/A
Probit slope: N/A 95% C.I.: N/A
NOAEL: 2000 mg a.i./kg bw
Endpoint(s) Affected: none

III. REFERENCES:

A reference list was not provided.

APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

male body weight gain
File: 7912m Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	1.340	4.840	7.640	4.840	1.340
OBSERVED	1	5	7	6	1

Calculated Chi-Square goodness of fit test statistic = 0.5095
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

male body weight gain
File: 7912m Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 483.720

W = 0.988

Critical W (P = 0.05) (n = 20) = 0.905
Critical W (P = 0.01) (n = 20) = 0.868

Data PASS normality test at P=0.01 level. Continue analysis.

male body weight gain
File: 7912m Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance

Calculated H statistic (max Var/min Var) = 4.22
Closest, conservative, Table H statistic = 49.0 (alpha = 0.01)

Used for Table H ==> R (# groups) = 4, df (# reps-1) = 4
Actual values ==> R (# groups) = 4, df (# avg reps-1) = 4.00

Data PASS homogeneity test. Continue analysis.

```
NOTE: This test requires equal replicate sizes. If they are unequal
      but do not differ greatly, the Hartley test may still be used
      as an approximate test (average df are used).


male body weight gain
File: 7912m       Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance
-------------------------------------------------------------------------------

Calculated B statistic =    3.04
Table Chi-square value =   11.34   (alpha = 0.01)
Table Chi-square value =    7.81   (alpha = 0.05)

Average df used in calculation  ==>   df (avg n - 1) =   4.00
Used for Chi-square table value ==>   df (#groups-1) =   3
-------------------------------------------------------------------------------

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is
      used to calculate the B statistic (see above).


male body weight gain
File: 7912m       Transform: NO TRANSFORMATION

                                ANOVA TABLE
-------------------------------------------------------------------------------

SOURCE             DF              SS                MS              F
-------------------------------------------------------------------------------
Between             3              34.500           11.500          0.380

Within (Error)     16             483.720           30.233
-------------------------------------------------------------------------------
Total              19             518.220
-------------------------------------------------------------------------------

  Critical F value =   3.24   (0.05,3,16)
  Since  F < Critical F  FAIL TO REJECT  Ho:All groups equal


male body weight gain
File: 7912m       Transform: NO TRANSFORMATION

      DUNNETTS TEST   -   TABLE 1 OF 2            Ho:Control<Treatment
-------------------------------------------------------------------------------
                              TRANSFORMED    MEAN CALCULATED IN
```

GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT	SIG
1	control	14.940	14.940		
2	500	16.820	16.820	-0.541	
3	1000	17.880	17.880	-0.845	
4	2000	18.360	18.360	-0.983	

Dunnett table value = 2.23 (1 Tailed Value, P=0.05, df=16,3)

male body weight gain
File: 7912m Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	5			
2	500	5	7.755	51.9	-1.880
3	1000	5	7.755	51.9	-2.940
4	2000	5	7.755	51.9	-3.420

male body weight gain
File: 7912m Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	5	14.940	14.940	14.940
2	500	5	16.820	16.820	16.820
3	1000	5	17.880	17.880	17.880
4	2000	5	18.360	18.360	18.360

male body weight gain
File: 7912m Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	14.940				
500	16.820	0.541		1.75	k= 1, v=16
1000	17.880	0.845		1.83	k= 2, v=16

```
                2000     18.360     0.983              1.86       k= 3, v=16
-------------------------------------------------------------------------------
s =    5.498
Note: df used for table values are approximate when v > 20.



female body weight gain
File: 7912f       Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies
-------------------------------------------------------------------------------

INTERVAL     <-1.5     -1.5 to <-0.5     -0.5 to 0.5     >0.5 to 1.5     >1.5
             _____     _____________     ___________     ___________     _____

EXPECTED     1.340         4.840             7.640           4.840       1.340
OBSERVED     0             7                 6               6           1

-------------------------------------------------------------------------------
Calculated Chi-Square goodness of fit test statistic =   3.0203
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.



female body weight gain
File: 7912f       Transform: NO TRANSFORMATION

Shapiro Wilks test for normality
-------------------------------------------------------------------------------

D =  869.600

W =    0.960

Critical W (P = 0.05) (n = 20) = 0.905
Critical W (P = 0.01) (n = 20) = 0.868
-------------------------------------------------------------------------------

Data PASS normality test at P=0.01 level. Continue analysis.



female body weight gain
File: 7912f       Transform: NO TRANSFORMATION

Hartley test for homogeneity of variance
-------------------------------------------------------------------------------

Calculated H statistic (max Var/min Var) =    2.81
Closest, conservative, Table H statistic =   49.0   (alpha = 0.01)
```

```
Used for Table H ==>     R (# groups) =   4,    df (# reps-1) =       4
Actual values    ==>     R (# groups) =   4,    df (# avg reps-1) =   4.00

------------------------------------------------------------------------

Data PASS homogeneity test. Continue analysis.

NOTE: This test requires equal replicate sizes. If they are unequal
      but do not differ greatly, the Hartley test may still be used
      as an approximate test (average df are used).


female body weight gain
File: 7912f       Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance
------------------------------------------------------------------------

Calculated B statistic =    1.27
Table Chi-square value =   11.34  (alpha = 0.01)
Table Chi-square value =    7.81  (alpha = 0.05)

Average df used in calculation  ==>   df (avg n - 1) =   4.00
Used for Chi-square table value ==>   df (#groups-1) =   3
------------------------------------------------------------------------

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is
      used to calculate the B statistic (see above).


female body weight gain
File: 7912f       Transform: NO TRANSFORMATION

                              ANOVA TABLE
------------------------------------------------------------------------

SOURCE            DF            SS                MS            F
------------------------------------------------------------------------
Between            3           109.260          36.420         0.670

Within (Error)    16           869.600          54.350
------------------------------------------------------------------------
Total             19           978.860
------------------------------------------------------------------------

  Critical F value =   3.24  (0.05,3,16)
  Since  F < Critical F  FAIL TO REJECT  Ho:All groups equal
```

female body weight gain
File: 7912f Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	18.720	18.720		
2	500	15.840	15.840	0.618	
3	1000	13.260	13.260	1.171	
4	2000	18.980	18.980	-0.056	

Dunnett table value = 2.23 (1 Tailed Value, P=0.05, df=16,3)

female body weight gain
File: 7912f Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	5			
2	500	5	10.398	55.5	2.880
3	1000	5	10.398	55.5	5.460
4	2000	5	10.398	55.5	-0.260

female body weight gain
File: 7912f Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	5	18.720	18.720	15.940
2	500	5	15.840	15.840	15.940
3	1000	5	13.260	13.260	15.940
4	2000	5	18.980	18.980	18.980

female body weight gain
File: 7912f Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	15.940				
500	15.940	0.596		1.75	k= 1, v=16
1000	15.940	0.596		1.83	k= 2, v=16
2000	18.980	0.056		1.86	k= 3, v=16

s = 7.372
Note: df used for table values are approximate when v > 20.